# Information Bulletin

## Grade 3 Mathematics
## 1995-96

**Alberta**
EDUCATION

This document was written primarily for:

| | |
|---|---|
| Students | ✓ |
| Teachers | ✓ |
| Administrators | ✓ |
| Parents | |
| General Audience | |
| Others | ✓ Superintendents |

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This bulletin contains general information about the Provincial Student Assessment program and information specific to the Grade 3 Mathematics Achievement Test. **This bulletin replaces all previous bulletins.**

**October 1995**

# Contents

# General Information

The Provincial Student Assessment Program provides teachers, parents, students, school administrators, Alberta Education, and the public with information about what students know and can do in relation to provincial standards. Group results are reported at school, district, and provincial levels to improve learning opportunities for students.

The assessments are administered in two subject areas at Grade 3—language arts and mathematics—and in four subject areas at grades 6 and 9—language arts, mathematics, social studies, and science.

The assessments are based on provincial standards, which reflect important learnings in the subject areas listed above. Classroom teachers from across the province are extensively involved in developing and field testing the assessment instruments.

## Administering the Assessment

Information about the nature of the provincial assessments as well as their administration to special needs students can be found in the *General Information Bulletin, Provincial Student Assessment Program,* which is mailed to all superintendents and principals each fall.

## Schedule

The written-response component of English and French Language Arts will be administered during the last week of May. The multiple-choice component of all achievement tests will be administered during the last two weeks of June. Specific information regarding scheduling is provided in the current *General Information Bulletin, Provincial Student Assessment Program.*

To minimize any risks to security, we recommend that all students complete the test on the same day. Superintendents approve a local schedule for achievement test administration within the dates provided. Students who are absent when the tests are administered and who return to school by the end of the school year must write the tests upon their return. By scheduling the tests early in the administration period, most, if not all, absentees can be tested upon their return to school. The principal is responsible for ensuring the security of the tests.

The tests that will be administered each year are:

### Grade 3
English Language Arts (*Part A: Writing* and *Part B: Reading*)
Mathematics (English and French forms)

### Grade 6
English Language Arts (*Part A: Writing* and *Part B: Reading*)
Français 6e Année (*Partie A: Production écrite* and *Partie B: Lecture*)
Mathematics (English and French forms)
Science (English and French forms)
Social Studies (English and French forms)

### Grade 9
English Language Arts (*Part A: Writing* and *Part B: Reading*)
Français 9e Année (*Partie A: Production écrite* and *Partie B: Lecture*)
Mathematics (English and French forms)
Science (English and French forms)
Social Studies (English and French forms)

## Students in French Immersion Programs

All students in French Immersion programs must write the French form of the achievement tests. Alberta Education will send a checklist to schools by January requesting an indication of how many English or French tests are required. These forms must be returned through jurisdiction offices by mid-February.

## Marking Achievement Tests Locally

Teachers will be able to mark the tests before returning them to Alberta Education. Teachers can use the results as part of an individual student's year-end assessment, as well as for planning instruction.

## Reporting the Results

Each school jurisdiction will receive a district report and individual school reports regarding their students' achievement, as well as guidelines for interpreting these results in relation to provincial standards.

To facilitate reflection on school programs, we expect that results will be shared with all school staff (not just teachers of grades 3, 6, and 9), as well as with parents and the community.

An individual profile for each student will be sent to the school that the student will attend in September. We also expect that these reports will be shared with parents.

Provincial results for each subject and grade will be made public in September, in documents titled *Assessment Highlights*.

## Broadened Assessment Initiatives

The Student Evaluation Branch has developed additional instruments to collect a broader base of information about what students know and can do than achievement tests themselves can provide. These instruments will be administered to a provincial sample of students in all subjects on a rotating basis. The following assessments will be given in 1996:

**Grade 3**
• problem-solving activities in mathematics

**Grade 6**
• "whole book" performance-based assessment in language arts

**Grade 9**
• problem-solving activities in mathematics

# Description of the Mathematics Assessment Standards

The provincial standards are the basis upon which we assess how well students have learned mathematics by the end of Grade 3. These standards reflect the essential learnings that all Alberta students are expected to achieve. Provincial standards are useful, therefore, for assessing Grade 3 students in all types of school programs—public, private, and home education.

## Purpose of Assessment Standards

The following statements describe what is expected of Grade 3 students who are meeting the *acceptable standard* or the *standard of excellence* on independent work at the end of the Grade 3 Mathematics program. The statements represent the standards against which student achievement will be measured. By comparing actual results with provincial standards, decisions can be made about whether achievement is, in fact, "good enough."

## Acceptable Standard

Students who meet the *acceptable standard* in Grade 3 Mathematics are expected to have a basic understanding of mathematical concepts and related procedural knowledge. They are expected to be able to demonstrate their understanding in concrete, pictorial, and symbolic modes, and to be able to translate from one mode to another. For example, students meeting the *acceptable standard*

should know that the solution to the number sentence $12 - 3 = \square$ is 9 and be able to demonstrate their understanding in concrete and pictorial ways. They are expected to be able to write related number sentences and verify them, using manipulatives and diagrams.

To meet the *acceptable standard,* students are expected to present ideas in an understandable way, using objects, diagrams, and appropriate everyday language.

Students meeting the *acceptable standard* are expected to perform the mathematical operations and procedures that are fundamental to the program, and apply what they know in solving simple problems in familiar settings. They are able to describe, to a limited degree, the steps they use to solve a particular problem.

The expectation is that students meeting the *acceptable standard* have a positive attitude about mathematics in their daily lives. They are able to demonstrate confidence when using simple mathematical procedures, and when applying problem-solving strategies in familiar settings.

### Standard of Excellence

Students who meet the *standard of excellence* in Grade 3 Mathematics are expected to have a superior understanding of mathematical concepts and related procedural knowledge. They are consistently able to demonstrate their understanding in concrete, pictorial, and symbolic modes, and easily translate from one mode to another. They are able to create problem situations to illustrate concepts and to analyze and explain relationships among concepts. For example, students meeting the *standard of excellence* should be able to write all number sentences related to $12 - 3 = \square$, justify them using manipulatives and diagrams, and create problem situations to exemplify the relationship. They should be

able to explain how $12 \div 3 = \square$ is related to $12 - 3 = \square$; also, they should be able to explain why these are not defined as related number sentences.

To meet the *standard of excellence*, students are expected to verbalize and write about mathematical situations clearly, using correct technical terms.

Students meeting the *standard of excellence* are expected to perform the mathematical operations and procedures that are fundamental to the program, and to be able to apply what they know in solving and creating novel problems. They are able to clearly describe the steps that they use.

Students meeting the *standard of excellence* should have a positive attitude toward mathematics and show confidence in performing mathematical tasks. They are expected to be self-motivated risk-takers who persevere when solving novel problems. They demonstrate initiative in trying new methods, and are creative in their approach to problem solving.

## *Grade 3 Mathematics Assessment*

### General Description

The Grade 3 Mathematics Assessment consists of four components:

• *Multiple-choice component*—completed by all Grade 3 students in the province

• *Performance-based component*—completed by a provincial sample of Grade 3 students

• *Learning contexts survey*—completed by a provincial sample of Grade 3 students

• *Timed number facts*—completed in June 1995 by a provincial sample of Grade 3 students. A master copy has been forwarded

to all schools for those teachers who wish to administer timed number facts.

## Multiple-Choice Component

The multiple-choice component has 45 questions integrated in a two-part narrative. Part A has 25 questions and Part B has 20 questions. Each part is designed to be completed in 30 minutes. Additional time of up to 15 minutes may be provided for students to complete each part. A break should be provided between Part A and Part B.

The blueprint for the multiple-choice component is on the next page. The sample questions on pages 7 to 18 may be used by teachers to help their students prepare for the provincial assessment.

Students will record answers to all questions directly in their test booklets.

Students will need pencils, rulers, erasers, and scrap paper for calculations.

Students may use manipulative materials and calculators. It is recommended that students use calculators only if they generally use them in their math program. Calculators are not needed to successfully complete the assessment.

## Reporting Categories Indicators

The following points briefly highlight the learnings for each reporting category.

### Knowledge
- recalls facts, concepts, terminology
- knows number facts
- recognizes place value
- knows procedures for computations
- knows procedures for constructing and measuring
- knows how to use a calculator/computer
- knows mental computation, estimation strategies

### Skills
- represents basic mathematical concepts in concrete, pictorial, and/or symbolic modes
- applies a mathematical concept in familiar and new situations
- creates new problem situations that exemplify a concept
- justifies answers
- judges reasonableness of answers
- communicates why and when certain strategies are appropriate
- applies basic mathematical concepts to solve problems
- demonstrates and applies relationships among numbers, operations, number forms, and modes of representation
- explains relationships among geometric forms
- uses a variety of problem-solving strategies

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*Blueprint*

| Strands | Reporting Categories | | Total Number of Questions*/Percent |
|---|---|---|---|
| | Knowledge | Skills | |
| Numeration | 4 | 10 | 14   (31) |
| Operations and Properties | 6 | 8 | 14   (31) |
| Measurement | 2 | 6 | 8   (18) |
| Geometry | 1 | 3 | 4   (9) |
| Data Management | 2 | 3 | 5   (11) |
| Total Number of Questions/Percent | 15  (33) | 30  (67) | 45  (100) |

\* The number of questions in each strand may vary slightly from those indicated.

## Performance-Based Component

A provincial sample of Grade 3 students from across the province will be selected to participate in the performance-based assessment in mathematics. The assessment provides students with real-life problem-solving activities, and addresses the learner expectations that cannot be easily measured using only paper-and-pencil strategies. The problem-solving and writing activities involved in the assessment have been developed by teachers, and are designed to model good classroom instruction and assessment methods.

Students will be asked to read a book and then solve several problems related to the context of the book. They will also be asked to reflect on their strategies and answers in written form. From this assessment, valuable information will be obtained about how students apply their knowledge in different areas when solving real-life problems.

## Learning Context Survey

Students involved with the performance-based assessment sample will also be involved with the learning context survey.

The purpose of the student questionnaire in mathematics is to examine the extent to which important math attitudes are evident, to look at student attitudes toward mathematics, and to correlate these attitudes with achievement.

## Confirming Standards

Confirming standards is a process whereby judgements about students' performance on the assessment are made in relation to provincial standards. For more information on confirming-standards procedures, refer to Appendix A of the *Achievement Testing Program Provincial Report, June 1993 Administration*.

# Sample Questions

These suggestions are to help teachers administer the sample assessment, given on the following pages, in the same way as the final machine-scorable component will be administered.

- Be sure students have a pencil, an eraser, scrap paper, and manipulatives or calculators, if these are used throughout the year.

- *Read the text that appears at the beginning of Part A to your students.*

- *Instruct the students to read and complete the questions independently to the end of Part A.*

- *Follow the same procedure for Part B.*

- Direct the students to fill in the circle in front of the answer that has been chosen.

See page 20 for other tips on helping students answer multiple-choice questions in mathematics.

There are sample questions on pages 7 to 18. These questions may be used with students. This collection of questions does not represent the test emphasis as presented in the bulletin.

Other questions from previous tests remain secured (see *General Information Bulletin, Provincial Student Assessment Program* for details).

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## PART A: SARAH THE SLEUTH

My name is Sarah. People call me Sarah the Sleuth. I listen. I think. I help people. I solve problems. My friend Tony from Tony's Pizza asked me to help him. He said, "Business is awful. No one comes to eat pizza here anymore. Where are all of the pizza eaters?" I went to Tony's Pizza and watched. I went to Mama Mia's Pizza and watched. I hurried back to Tony's Pizza to tell him what I saw.
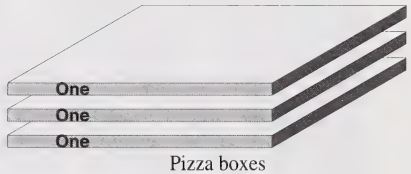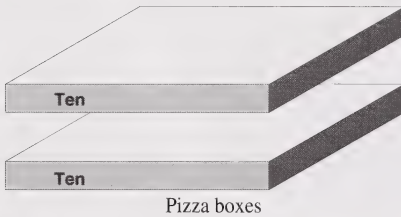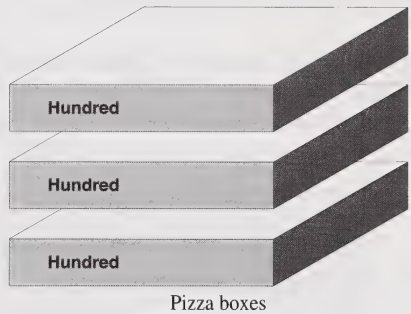
**Use this map to answer question 1.**

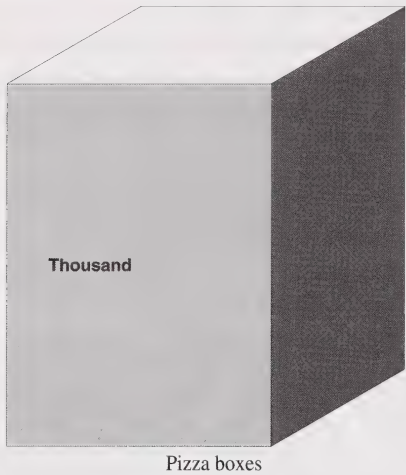### Neighbourhood Map
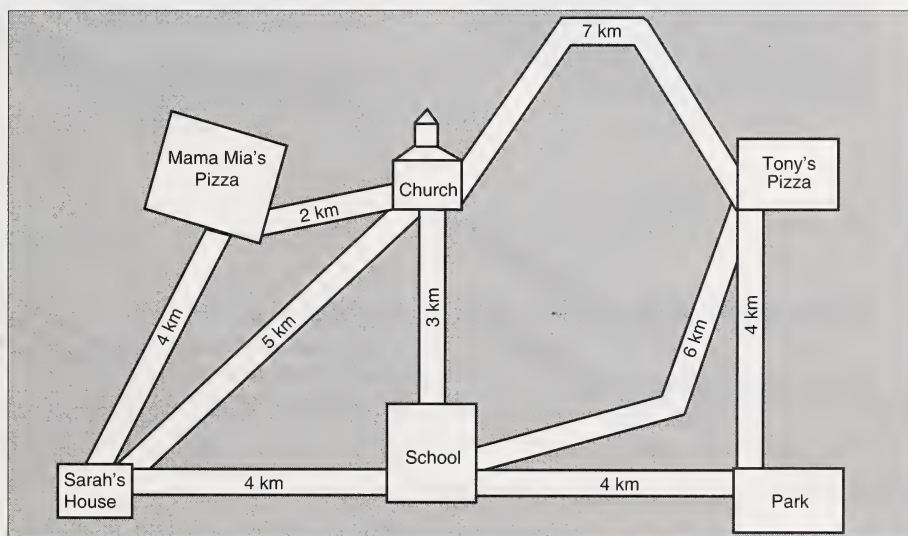


1.  I took the **shortest** route from my house to Tony's Pizza.

    **Which route did I take?**

    O   Sarah's House → School → Tony's Pizza
    O   Sarah's House → Church → Tony's Pizza
    O   Sarah's House → School → Park → Tony's Pizza
    O   Sarah's House → Mama Mia's Pizza → Church → Tony's Pizza

**2.** I arrived at Tony's Pizza.

Tony was checking his supply of unfolded boxes for pizza.
This is what he has:

Thousand

Pizza boxes

Hundred

Hundred

Hundred

Pizza boxes

Ten

Ten

Pizza boxes

One
One
One

Pizza boxes

## How many pizza boxes does Tony have?

○ 1233
○ 1323
○ 3213
○ 3231

**Use this information to answer questions 3 and 4.**

Tony's Pizza has 8 tables and 32 chairs.  I saw 18 chairs with people sitting in them.

3.  **How many chairs are empty?**
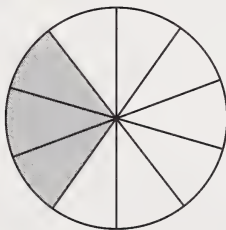
    O   40
    O   26
    O   24
    O   14

4.  Each table has the same number of chairs.

    **How many chairs are at each table?**

    O   3
    O   4
    O   5
    O   6

**Use this information to answer question 5.**

"One person usually eats this much pizza," Tony said.  He drew a picture and shaded in the number of pieces that one person usually eats.



5.  **Which decimal shows the SHADED part of the pizza?**
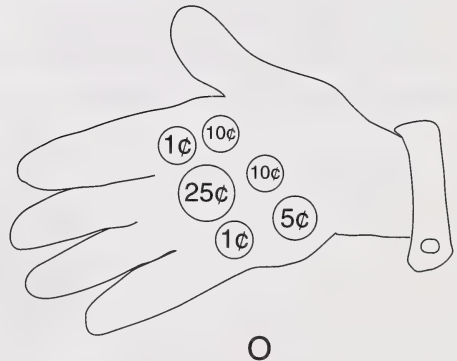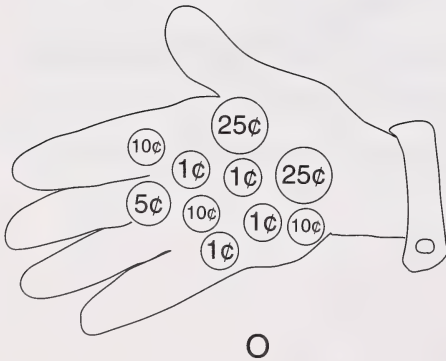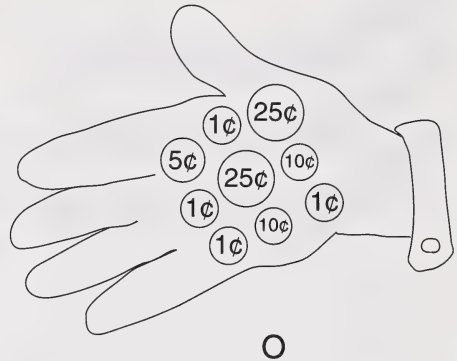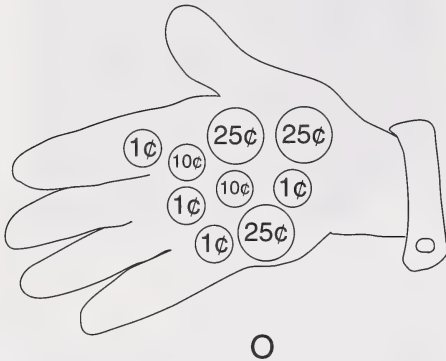
    O   0.3
    O   0.7
    O   1.0
    O   3.0

**6.** I, Sarah the Sleuth, then went to Mama Mia's Pizza.

I was thirsty!

I decided to buy a glass of juice.

It cost $0.89.

**Which hand shows $0.89?**



O



O



O



O

**7.** I watched the cook.
He made 9 ham and pineapple pizzas.  He put 5 pieces of ham on each pizza.

**How many pieces of ham did the cook use?**
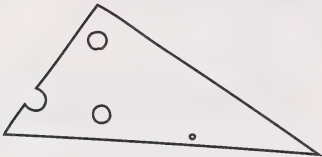
O   14
O   40
O   45
O   54


**8.** A large tin of pineapple holds 750 mL.
A small tin of pineapple holds 525 mL.

**How many MORE millilitres are there in a large tin of pineapple than in a small tin of pineapple?**

O     225 mL
O     235 mL
O     600 mL
O   1275 mL

**9. Which picture can be folded so that one half matches the other half?**



O



O



O



O

## PART B: A MYSTERY IS SOLVED

I solved the mystery! I saw the cook use a special spice. A secret ingredient was the answer!

I went back to Tony's. Tony and I went into the kitchen. Tony began to mix spices. He made his own secret ingredient. It smelled good. "We will have a party," said Tony joyfully, "and we will eat pizza with my secret spice!"

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**10.** Tony put the secret spice in his spice rack.
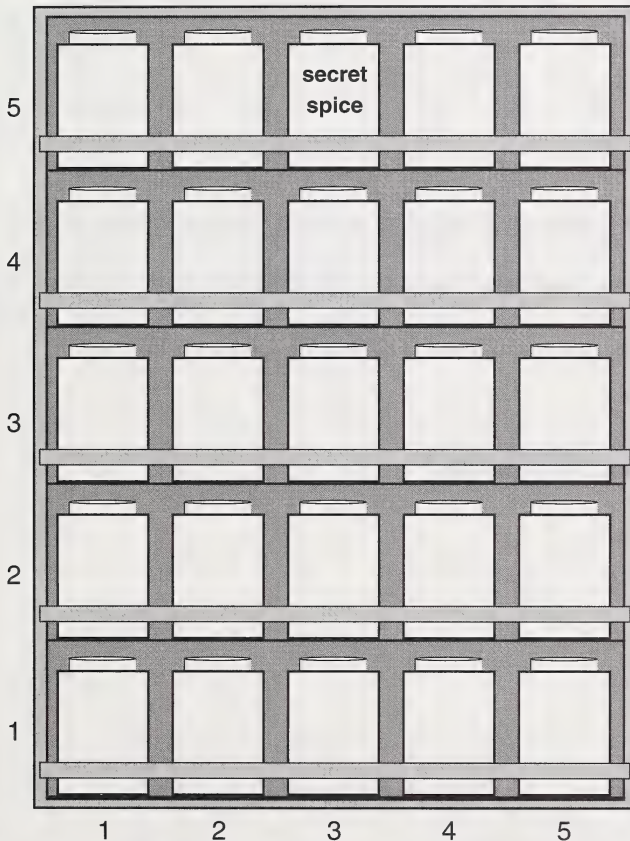


**The secret spice is located**

O   across 2, up 4
O   across 5, up 3
O   across 3, up 5
O   across 4, up 2

We planned the party.

Today is July 14.

We decided the party will be one week from today.

# July

| S | M | T | W | Th | F | S |
|---|---|---|---|---|---|---|
|  |  |  |  | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 25 | 26 | 27 | 28 | 29 | 30 | 31 |

**11. What is the date of the party?**

O   July 14
O   July 20
O   July 21
O   July 22

**12. On what day of the week will the party be held?**

O   Tuesday
O   Wednesday
O   Thursday
O   Saturday

**13.** Invitations are sold in boxes of 10.
Tony and I decided to invite 28 people.

**How many BOXES of invitations should we buy?**

O   10
O   5
O   3
O   2
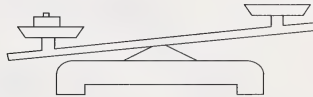
**14. How many invitations will be left over?**

O   2
O   5
O   8
O   12

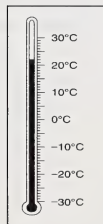**15.** On the day of the party, Tony said, "I'd better get started on those pizzas."

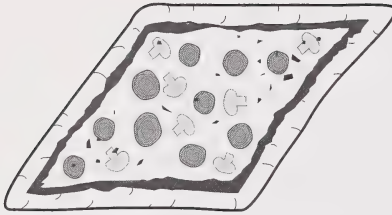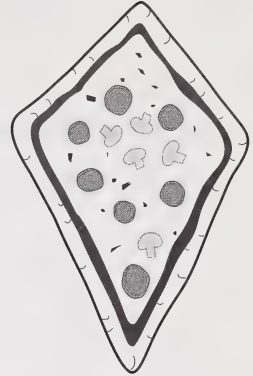**Which instrument should Tony use to measure the distance across the pizza pan?**

O

O

O

O

**16.** Tony can make pizzas of different shapes.

**Which of these shapes is most like a square?**



O



O



O



O
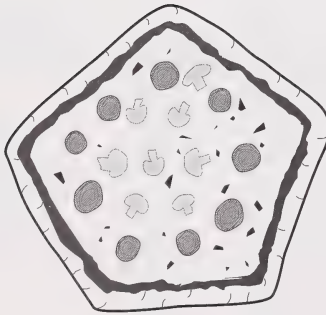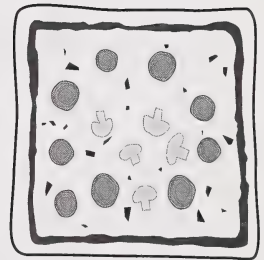
**17.** It takes Tony 2 min to put toppings on a deluxe pizza.

**To find out how many minutes it will take to put toppings on 6 deluxe pizzas, Tony should**

O   add 2 and 6
O   subtract 2 from 6
O   divide 6 by 2
O   multiply 6 by 2

**18.** Tony is ready to bake the pizzas.
The oven temperature must be 210°C to bake pizzas.



Degrees Celsius
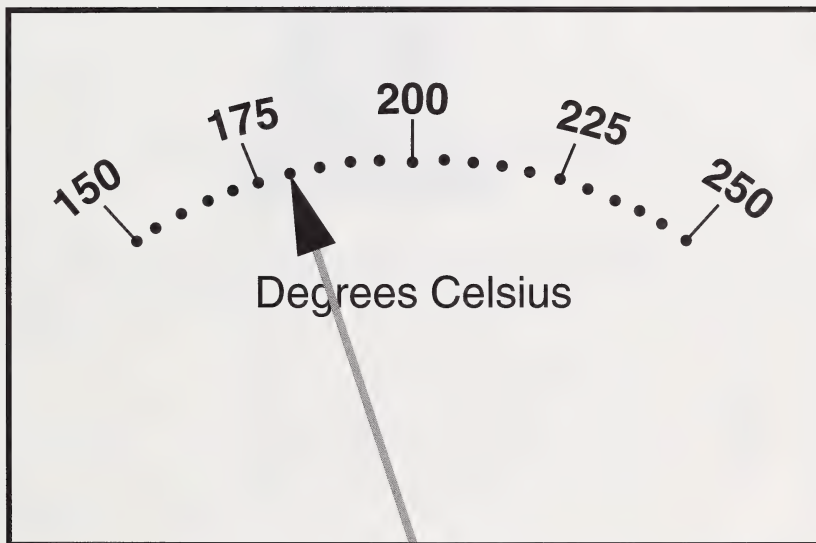
**How many degrees must the oven temperature rise before Tony can bake the pizzas?**

O    30°
O    40°
O   150°
O   170°

**19.** Tony checked the juice machine.
When it is full, the juice machine holds 20 L of juice.
Now it is half full.
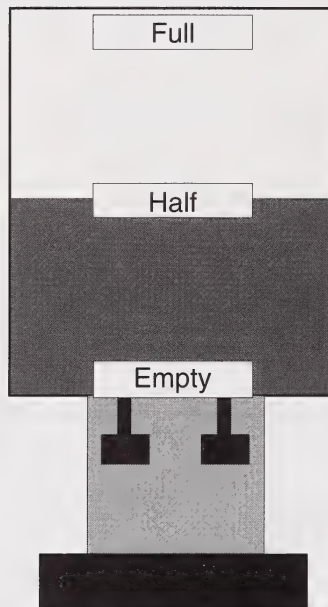


**How many litres of juice are left in the juice machine?**

O   10 L
O   15 L
O   20 L
O   40 L

**20.** Altogether, 21 people said they would come to the party.
So far, 15 have arrived.

**How many more people are coming?**

O   3
O   4
O   5
O   6

## Key and Descriptors

| # | Key | Program Strand | Reporting Category* | Curriculum Standard | Examples of Assessment Standard** |
|---|-----|----------------|---------------------|---------------------|-----------------------------------|
| 1 | A | Operations and Properties | S | Compare the sum of 2 and 3 addends to determine which is the least | A |
| 2 | B | Numeration | S | Use place value to find a number | A |
| 3 | D | Operations and Properties | S | Identify needed information and use subtraction to solve the problem | A |
| 4 | B | Operations and Properties | S | Recognize an equal-sharing question and divide | A |
| 5 | A | Numeration | K | Recognize 10 equal parts with 3 parts shaded as a decimal, and write three-tenths as a decimal | A |
| 6 | C | Measurement | S | Count coins and determine which set has a value of 89 cents | A |
| 7 | C | Operations and Properties | S | Recognize a multiplication situation and multiply | A |
| 8 | A | Operations and Properties | K | Recognize subtraction situation and subtract 3-digit numbers | A |
| 9 | C | Geometry | K | Identify the symmetrical figure | A |
| 10 | C | Data Management | K | Describe a location on the grid | A |
| 11 | C | Measurement | S | Use the calendar. Understand the meaning of a week | A |
| 12 | B | Measurement | K | Read the calendar to determine the day of the week | A |
| 13 | C | Numeration | S | Understand that 3 sets of 10 will include 28 | E |
| 14 | A | Operations and Properties | S | Subtract, using 2-digit numbers | A |
| 15 | D | Measurement | K | Recognize the instrument used for measuring | A |
| 16 | D | Geometry | K | Identify a 2-dimensional figure | A |
| 17 | D | Operations and Properties | K | Recognize a multiplication situation | A |
| 18 | A | Numeration | S | Identify the temperature on a thermometer. Recognize the scale used. Count by 5s to reach the new temperatures | E |
| 19 | A | Numeration | S | Understand the meaning of half when applied to capacity. Divide by 2 | A |
| 20 | D | Operations and Properties | S | Recognize subtraction situation and subtract | A |
| | | | | | |

\*    S—Skills includes problem solving and application of knowledge.
     K—Knowledge includes knowledge of facts, concepts, generalizations, and procedures.
\*\*   A—Students meeting the acceptable standard should be able to correctly answer questions such as these.
     E—In addition to answering the questions identified for the acceptable standard, students meeting the standard of excellence should be able to correctly answer questions such as these.

# Suggestions for Helping Students

> *I strongly advocate preparing children to understand tests and testing through extensive class discussion about the makeup of the test and how to take it, and then adequate practice to find out their own particular weaknesses in approaching tests.*
>
> —Graves, p. 183

We hope that teachers will share the following information with their students to help them prepare for the Mathematics assessment.

The best way to prepare students for writing the mathematics exam is to use instructional time teaching the important learnings in Grade 3 Mathematics.

Teachers may also wish, however, to familiarize their students with the format of the machine-scorable component of the assessment and the kinds of questions that will appear on it by having them work through the sample questions included in this bulletin.

## Suggestions for Answering Multiple-Choice Questions

The following suggestions are provided to help prepare students for the Grade 3 Mathematics machine-scorable component.

1. Have students listen to the story BEFORE they complete the mathematics questions.

   **This will give them a setting for the questions so that they will be more meaningful.**

2. Guide students to look at ALL information and to think carefully before they answer the questions.

   **This will guide them to obtain information from numbers, words, signs, charts, pictures, graphs, or maps.**

3. Encourage students to REMEMBER the question that they need to answer as they look at all the information.

   **This will help them focus on what is being asked of them.**

4. Encourage students to go back and REVIEW the information given.

   **This will help them keep on track when two or three questions pertain to the same diagram. (Situations like this are always identified with these words: "Use this information to answer questions ☐ and ☐ .")**

5. Encourage students to CHECK their calculations, even when their answer is one of the choices.

   **This will help them choose the correct answer rather than an answer that is a commonly made mistake.**

6. Guide students to choose one BEST answer.

   **This will help them make a choice when two answers appear to be close and they can't identify the correct answer right away.**

# Credit

Donald H. Graves, *Build a Literate Classroom* (Toronto: Irwin Publishing, 1991), p. 183.

# Alberta Education Contact

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